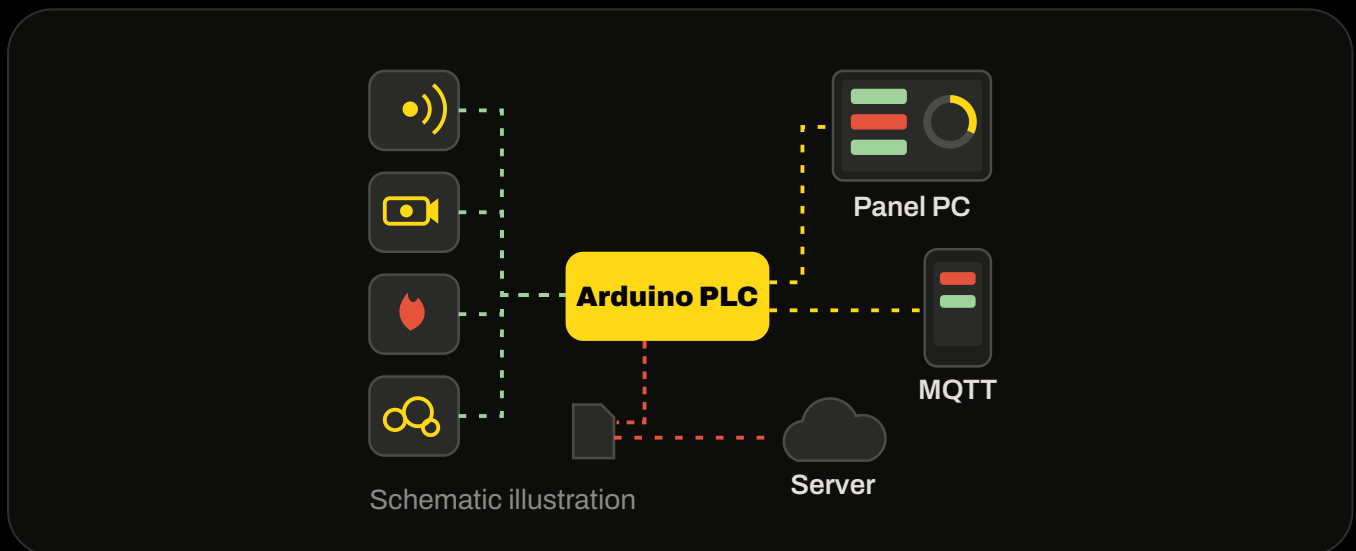


SECURITY SYSTEM · ARDUINO PLC

Intruders, fire, gas. One PLC watches all three.

One PLC, Panel PCs and phones on MQTT, data kept on SD and a server.

[Read the interactive case study online ›](#)


3

hazards: burglary, fire and gas

4

sensor types on one PLC

2

ways to monitor: Panel PCs and MQTT

24/7

control, monitoring and backup

THE CHALLENGE

Watch several hazards at once. Never lose the record.

The project is designed as a fully equipped security system that can focus on different hazards and adapt to specific objectives: burglary, fire and gas contamination. Different kinds of sensors track them, and an Arduino based PLC manages them.

01

Three hazards, one system

Motion sensors and security cameras against burglary. Infrared sensors against fire. Gas sensors against intoxication, for the more dangerous industrial processes.

02

Control and monitoring 24/7

All processes controlled and monitored at all times. The system is fully automated, except some parameters that people set and the reaction they choose for each hazard.

03

Easy to manage

From the PLC, from the Panel PCs, or from a phone, a tablet or a PC, anywhere and at any time.

04

A backup that is always there

The sensor data stays on the SD card of the PLC and goes to a server. The camera recordings go straight to the server.



Open to change

Add more sensors and more monitoring methods. Change the hardware, and reprogram the PLC with the Arduino IDE when the site changes.

HOW IT WORKS

Three loops: detect, monitor, keep.

Loop 1 · Detect and react

Four sensor types feed one PLC. The PLC decides.

Motion sensors, security cameras, infrared fire sensors and gas sensors send their signals to the inputs of the PLC. The source names analog inputs, and RS-232 or RS-485 when the sensor supports it. The system works by itself: people set some parameters and choose the reaction method for each hazard.

Loop 2 · Monitor two ways

Panel PCs on site. Phones, tablets and PCs through MQTT.

The PLC sends its data through an Ethernet switch to several Panel PCs. The data also goes to an MQTT server, so phones, tablets and PCs can connect at the same time, from anywhere. Both ways use an interface made with Node-RED, ready for different professional profiles.

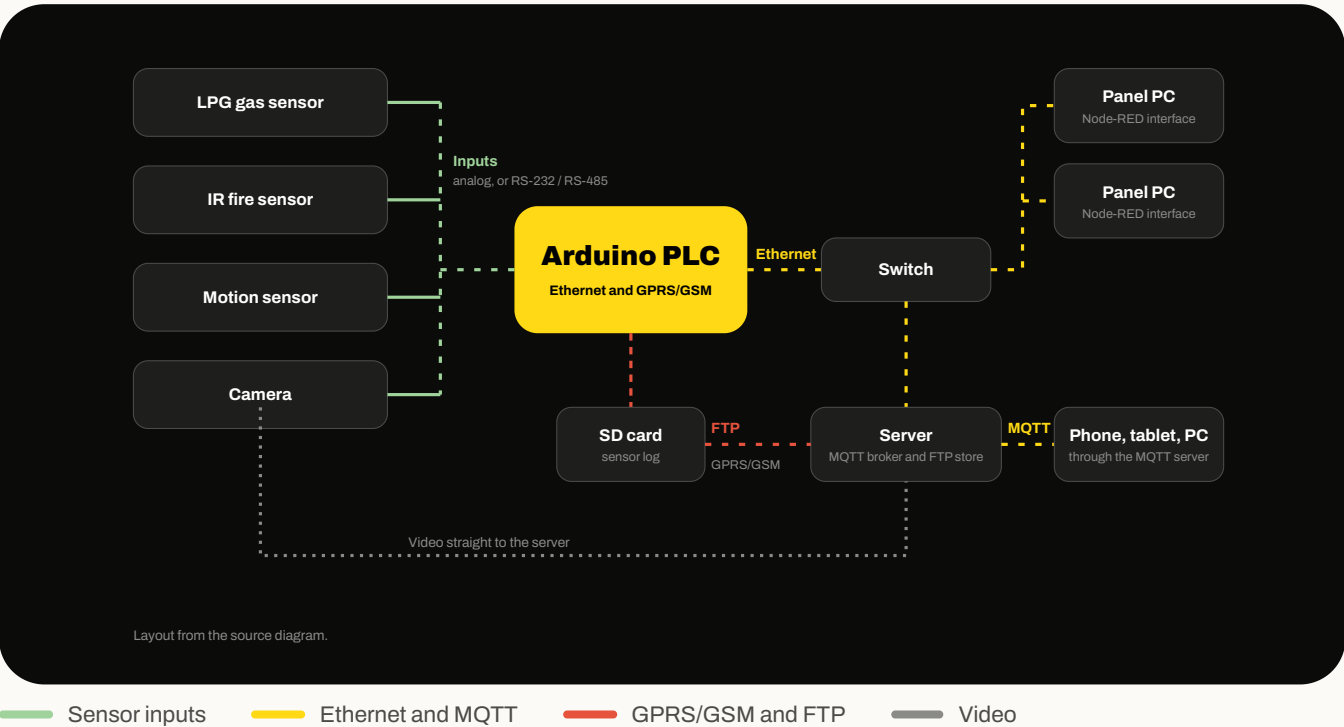
Loop 3 · Keep a copy

The SD card keeps the data. FTP sends it to the server.

The sensor data is saved on the SD card of the PLC and sent to the server with FTP over the GPRS/GSM link. The camera recordings go straight to the server, because video files are too big for this path.

How does one PLC run an intrusion, fire and gas system?

Four sensor types go to the inputs of an Ethernet and GPRS/GSM PLC based on Arduino. The PLC sends its data through an Ethernet switch to several Panel PCs and to a server. The server runs MQTT for phones, tablets and PCs and stores the sensor files that the PLC uploads with FTP over GPRS/GSM. The camera recordings go straight to the server.



Signals and data

Signal	Between	Type	Purpose
Motion	Motion sensor → PLC	Input	Detects people in a protected area
Camera	Security camera → PLC	Input	Detects a robbery attempt. The video itself goes to the server
Fire	IR fire sensor → PLC	Input	Detects the infrared light of a flame
Gas	LPG gas sensor → PLC	Input	Detects gas contamination
Sensor bus	Sensors ↔ PLC	RS-232 / RS-485	Option when the sensor supports it
Local view	PLC → switch → Panel PCs	Ethernet	Node-RED interface on several Panel PCs
Remote view	PLC → MQTT server → phone, tablet, PC	MQTT	Several devices at the same time, anywhere
Sensor backup	SD card of the PLC → server	FTP over GPRS/GSM	Copy of the sensor data, kept on the card and on the server
Video	Camera → server	Direct	Recordings too big for the FTP path

An Arduino PLC to decide. Panel PCs to watch.

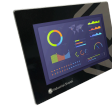


M-Duino Ethernet PLC Arduino 38R

Role	Sensor inputs, reactions, SD card log, link to the Panel PCs and the server
Inputs	12: 8 analog/digital (0-10 V), 4 digital optoisolated
Outputs	22: 16 relays, 6 analog/digital/PWM (0-10 V)
Comms	Ethernet (RJ45), RS-485, RS-232, TTL, I2C, SPI
Built in	Real-time clock, microSD slot
Power supply	12 to 24 Vdc
Mounting	DIN rail TS35, IP20

The case names "an Ethernet and GPRS/GSM PLC based on Arduino" and does not publish the exact model. The PDF includes a product photo of the M-Duino 38R. The GPRS/GSM versions of the M-Duino are described in the M-Duino GPRS family datasheet.

[See the M-Duino 38R >](#)



TouchBerry Pi Panel PC 10.1"

Role	Node-RED interface on site
Screen	10.1"
Computer	Raspberry Pi 4
Link to the PLC	Ethernet, through the switch

The case says "several Panel PCs". The old case page showed the TouchBerry Pi 10.1" (Raspberry Pi 4B). The image and the link show the current TouchBerry Pi Panel PC 10.1" FLEX.

[See the TouchBerry Pi 10.1" >](#)

One controller, three hazards

Intrusion, fire and gas sensors share one PLC and one program. One place to set the parameters and the reactions.

Two ways to watch

Panel PCs on site through an Ethernet switch, and phones, tablets and PCs through an MQTT server. Several people can follow the same alarm.

A local copy first

The PLC saves the sensor data on its own SD card before the upload. A server problem does not erase the record.

Two networks

Ethernet on site and GPRS/GSM for the backup. The source lists both as ways to keep the data.

Node-RED for every profile

The same Node-RED interface on the Panel PCs and on the remote devices, made for different professional profiles.

Ready to grow

More sensors and monitoring methods can be added. The program is made with the Arduino IDE, so your team can read it and change it.

SIMILAR SITE?

Tell us your hazards and your site. An engineer will answer.

Tell us your hazards, your zones and sensors, and where the alarms and the data must go. We will tell you which controller fits.

READ IT ONLINE

industrialshields.com/case-study-security-system-intrusion-fire-gas-plc

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